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U.S.-JAPAN COMPETITION IN BUSINESS TELEPHONE EQUIPMENT

SUMMARY

The limited success American companies have had in selling telephone equipment to Nippon Telegraph and Telephone Public Corp. has become a symbol in U.S. business and legislative circles of Japan's closed market. It has also turned the spotlight on the participation of Japanese manufacturers in the U.S. telephone equipment market. Nippon Electric Co., Ltd., Fujitsu, Ltd., Oki Electric Industry Co., Ltd., Hitachi, Ltd., Toshiba Corp. and several other Japanese makers have made inroads in the U.S. market for business telephone equipment, mainly by parlaying their expertise in semiconductor and computer technologies to design and manufacture state-of-the-art products that are compact, modular and reliable and that offer customers an excellent price-performance ratio. But they are by no means the main competitors of American Telephone and Telegraph Co. in the private branch exchange and key telephone system market. Moreover, their manufacturing and marketing prowess will be tested over the next few years as deregulation reshapes the business telephone equipment marketplace.

Deregulation Spurs Competition

Until the late 1960s the Federal Communications Commission (FCC) endorsed the tenaciously held position of American Telephone and Telegraph Co. (AT&T) that only telephone instruments and switching equipment owned and supplied by its operating companies could be connected to the Bell System telephone network, which then covered about 84 percent of the telephones in service in the United States. With the landmark Carterfone decision in 1968, however, the FCC began to move in the direction of greater competition and decontrol in the telephone terminal and switching equipment market. That ruling allowed the connection of customer-provided equipment into Bell System lines

as long as a protective coupler, rented to the customer by the operating companies, was used.

AT&T defended the interface-device requirement on the grounds that "foreign" equipment would damage the national telephone network. Outside telephone equipment suppliers, claiming that the couplers were hard to obtain and expensive to rent, maintained that the requirement represented AT&T's last-ditch effort to thwart competition in the marketplace. The FCC finally eliminated this barrier to market entry in late 1977 and early 1978 when it expanded the registration program for telephone terminal equipment, initiated in 1974, to include telephone instruments, key telephone systems (KTSs - multi-line telephones that provide pushbutton selection of a specific line from a number of central office lines) and private branch exchanges (PBXs - a switchboard, located on the customer's premises, that connects a common group of trunk lines and provides service to a number of telephone sets). Since then, any equipment that has received FCC type approval can be directly connected to the public-switched telephone network.

The 1968 Carterfone decision triggered an influx of competitors into the market, offering business customers PBXs and key systems that incorporated technical advances not available in the equipment supplied by Western Electric Co., Inc., AT&T's wholly owned manufacturing arm, and that could be purchased as well as leased. In the forefront of the movement were foreign manufacturers like Canada's Northern Telecom Ltd. and Mitel Corp., Hitachi, Ltd., Oki Electric Industry Co., Ltd., Nippon Electric Co., Ltd. (NEC), Fujitsu, Ltd., Iwatsu Electric Co., Ltd., Toshiba Corp. and Nitsuko, Ltd. from Japan, Siemens AG (West Germany), LM Ericsson (Sweden), Plessey Telecommunications Ltd. (United Kingdom) and CIT-Alcatel (France).

The new market opportunities also spawned a number of entrepreneurial American firms, including such current major competitors as Rolm Corp. and TIE/Communications, Inc. Joining these start-up firms and foreign vendors as suppliers to the new end-user market were the established manufacturers of equipment for the nation's independent telephone operating companies — makers like ITT Telecommunications Corp., Stromberg-Carlson Corp. (at that time a General Dynamics Corp. subsidiary) and General Telephone & Electronics Corp. (GTE), then as now the number-two U.S. telephone equipment producer through its Automatic Electric Inc. unit as well as the largest independent telephone company.

Typical of a young market, the interconnect industry, as it came to be known, was initially characterized by fairly high turnover among both manufacturers and distributors. By the late 1970s, though, the industry had stabilized, aided in part by the FCC's registration program. A group of large, financially strong national distributors had emerged to back the growing number of local sales and service centers. Upstart makers like Rolm had matured, and major foreign manufacturers, including Northern Telecom, Mitel, Siemens, Oki, Hitachi, Fujitsu and NEC, were increasingly supplying the market from onshore production facilities.

Chipping Away at AT&T's Market

Even during the interconnect industry's shakedown phase, the new competitors were quickly building share in the business market, particularly in the market for PBXs. Only ten years after the Carterfone decision, interconnect vendors had captured about 10 percent of the installed PBX base, according to recent estimates by the North American

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Telephone Association (NATA). The interconnect industry's trade association placed the Bell System's share of 1977 PBX lines in service at 78 percent and that of independent telephone companies at 12 percent. (NATA's data understate market penetration by interconnect manufacturers since the figures are based on what type of company installs the equipment — Bell System operating company, independent operating company or non-telephone company installer, not who manufactures it.)

These initial interconnect inroads were the result of a straightforward marketing strategy: offering offices, retailers, factories, motels and hotels, hospitals, educational institutions and other medium and large concerns electronic switchboards. While more expensive than the electromechanical systems then being manufactured by Western Electric, the new systems had telephone-calling features not technically obtainable with the older hardware — features like simplified dialing, music on hold, call forwarding, toll restriction and paging. Moreover, electronic PBXs were cheaper to install than electromechanical ones, and they could be purchased outright, an important consideration for customers that expected to keep their equipment.

AT&T finally unveiled the Dimension family of electronic PBXs in 1976, but by that time several of Western Electric's interconnect competitors had already introduced the next generation of switchboards to the American market. Unlike the Dimension and other analog electronic PBXs, which handle only the continuous-wave audio tones of voice conversations, the switches announced in the 1975-76 period by Rolm, Northern Telecom and American Telecom Inc. (Fujitsu's U.S. manufacturing and marketing subsidiary) switch signals in the form of digital pulses or bits of information. This gives them the capability to transmit and receive data in addition to carrying telephone calls and positions digital PBXs to be the communications link in the automated office of the future.

While the arrival of digital PBXs had long-term implications for AT&T's product-development and marketing strategies, the Bell System faced a more immediate problem in the late 1970s: how to get its massive base of electromechanical PBX customers to trade up to the Dimension. The marketing tactic AT&T hit on in 1979 was to hike lease rates on the older-generation equipment by up to 70 percent. The company recognized that its "migration strategy" could push customers right into the arms of Mitel, NEC Telephones, Inc., Oki Electronics of America, Inc., Hitachi America Inc., Siemens, ITT, Stromberg-Carlson and other interconnect makers of analog PBXs or even into the arms of digital switchboard makers, including by then GTE and Harris Corp. But AT&T also knew that the interconnect industry had neither the production capacity nor the installation capability to meet the wave of demand its migration strategy would create.

AT&T's migration strategy did work, but the cost in terms of market ceded to the interconnect industry was probably higher than the company anticipated. From a 78-percent stake in 1977, the Bell System's share of PBX lines in operation fell to 70 percent in 1981, NATA estimated, while interconnect vendors upped their share of the expanding market to 19 percent. Even more telling of the erosion in the Bell System position are data compiled by the Eastern Management Group on 1981 shipments of PBX lines. According to the Morris Plains, New Jersey industry tracker, AT&T accounted for only 38.5 percent of the PBX lines shipped that year — a far cry from its 80-percent-plus share of yearly shipments in the 1960s. The big interconnect winner in 1981 was Mitel, which garnered 14.3 percent of the market with its line of relatively small SX analog switches. Close behind was Rolm with a 14-percent share for its CBX family of digital PBXs, trailed by Northern Telecom with a 9.5-percent stake for the SL-1 digital switch. The other major shippers of PBX lines in 1981, Eastern Management Group estimated, were GTE (5 percent), American Telecom (4.6 percent), NEC Telephones (4.4 percent) and Harris (3.9 percent).

Although Rolm and Northern Telecom have prospered by targeting their increasingly sophisticated digital systems at customers requiring PBXs with more than 750 lines, AT&T has proved to be most vulnerable to interconnect competition in the small (under 250 lines) PBX market, if only because low-end switchboards make up the majority of the installed base. This is the market segment Mitel has cultivated with so much success. It is also where American Telecom's Focus series of digital equipment and the analog NEAX 12 by NEC Telephones have achieved sales gains, helped in both cases by the systems' modular construction, which makes expansion easy.

The encroachment of electronic key telephone systems (EKTSs) and AT&T's own Horizon hybrid key/PBX system into the market served by small-configuration PBXs has also apparently caused PBX market-share problems for the Bell System. Customers replacing electromechanical PBXs with 60 to 100 lines in reaction to AT&T's migration strategy have been the main market for hybrids and large EKTSs like NEC Telephones' Electra 100, Iwatsu America Inc.'s top-of-the-line Omega III model and Toshiba America, Inc.'s Strata III. For these businesses, hybrids and EKTSs offer many of the features of electronic PBXs but at a lower cost, plus the relative simplicity of key system usage.

Despite their sales success with large EKTSs and the availability of a broad line of smaller EKTSs, interconnect manufacturers have had a tougher time building market share in key systems than in PBXs. According to NATA's data, interconnects were only able to raise their share of the installed base of stand-alone key systems from under 4 percent of the lines in operation in 1977 to 9 percent five years later. These five points did come out of the Bell System's market, but the operating companies still had 74 percent of the installed base in 1981. Moreover, AT&T's share of 1981 shipments was not too far under that figure, the Eastern Management Group calculated.

To a large extent, AT&T's staying power in the key system market has reflected a mismatch between what customers forced to migrate from the ubiquitous 1A2 electromechanical key system want for a replacement and the products offered by many interconnect vendors, particularly the American units of Japanese companies. Most businesses in this 2-million-customer pool still have a need for a low-cost, no-frills, small-configuration (under 12 extensions) system. They are therefore moving to the 1A2's upgrade, the Comkey 416, or to similar basic equipment made by GTE, TIE/Communications or ITT, the Bell System's closest competitors in the key system field. Some 1A2 customers of course are trading up to the small- and medium-capacity EKTS market, where NEC Telephones (Electra 28) and Iwatsu America (Omega III Models ET-816 and ET-1632) are well represented, or even to hybrids like AT&T's Horizon.

An Industry in Transition

Interconnect makers continued to chip away at the Bell System's installed base of business telephone equipment in 1982, upping their share of the PBX market by two percentage points to a projected 21 percent and increasing their stake in the key systems base by about the same margin to an estimated 11 percent. These gains, significant in themselves, are even more noteworthy because they occurred in a marketplace characterized by NATA and other industry observers as the most confused since the Carterfone decision in 1968. The economy's weak performance and the uncertain outlook for 1983 contributed to the disorder, as did AT&T's migration strategy, but the overriding factors were the impending deregulation of AT&T's new telephone terminal equipment business and AT&T's divestiture of its Bell System operating companies.

Deregulation -- ordered by the Federal Communications Commission in an April 1980 ruling -- and divestiture -- the result of an August 1982 court-approved settlement

agreement between the Justice Department and AT&T — represent two different solutions to the competitive problems caused by AT&T's vertical integration, particularly its ownership of local telephone companies. Their impact, though, is the same: a complete restructuring of the telecommunications business over the next several years.

Highlighting the events that will reshape the market in which manufacturers and vendors of telephone equipment compete are the following developments:

- As of January 1, 1983, AT&T must offer all new telephone equipment through a separate, unregulated subsidiary. The new unit, American Bell, Inc., is free to sell or lease PBXs, key systems, telephone instruments and any new products AT&T might introduce for business or residential customers, at prices not subject to tariffs or government review.

- Starting on the same date, Bell System operating companies will no longer provide new customer-premises equipment. They can continue to offer items from inventory and recycle leased equipment returned by customers. Moreover, with the permission of state utility commissions, the operating companies can sell off equipment installed before January 1, 1983.

- On January 1, 1984, as now scheduled, AT&T will spin off its 22 local operating companies into seven regional holding companies. Remaining with AT&T will be Western Electric, Bell Telephone Laboratories, Inc., the Long Lines Department (which will continue to operate the long-distance network), AT&T International Inc. and American Bell. At that time, all of the Bell System's installed customer-premises equipment — including an estimated 105,000 PBXs, 2.5 million stand-alone key systems and 147 million residential and business telephone instruments -- will be transferred from the operating companies to American Bell.

- After January 1, 1984, the divested Bell System operating companies will have the option to market, but not manufacture, new customer-premises equipment on an unregulated basis.

Interconnect manufacturers and industry analysts agree that deregulation and divestiture should enhance marketing opportunities for the interconnect industry over the long term. In the short run, though, these far-reaching actions could cause problems. Interconnect makers have already experienced the first fallout since the operating companies, no longer able to handle new customer-premises hardware, have stopped buying PBXs, key systems and telephone sets from interconnects, affecting a small but not insignificant part of their trade. In addition, at least some potential interconnect business customers are postponing buying decisions until they find out whether the Bell System will be allowed to sell the installed base of end-user equipment during the year-long transition period before divestiture.

What makes these short-term sales problems bearable for interconnect vendors is the prospect of the divested Bell System operating companies becoming marketing outlets for PBXs, key systems and telephone sets. Interconnect suppliers concede that the local carriers will retain close links with Western Electric after divestiture, particularly in the area of heavy network equipment like central office switches, but they expect the spun-off companies to seek out non-AT&T sources of customer-premises equipment. At the same time, independent manufacturers recognize that how quickly new sales opportunities materialize for them depends on how many of the divested companies re-enter the end-user equipment market after January 1, 1984 as well as how fast those that do can

establish engineering and procurement offices to evaluate and buy non-Western Electric products and build up marketing and support staffs.

The other big competitive question mark for the interconnect industry is American Bell. Its impact on the market hinges on several factors, including pricing policies, but near the top is how close the AT&T unit is to introducing new Western Electric customer-premises equipment, particularly the code-named Antelope digital PBX, or announcing enhancements for the existing line of business equipment made by Western Electric. Whether the manufacturing arm can bring its costs in line with competitors' is another key variable, as is whether Bell Labs can compress its long product-development cycle.

Balancing these questions about American Bell's competitive position are several knowns. The company has built up a business sales force faster than expected, allowing it to get off to a running start on January 1. In addition, the line of Western Electric business equipment American Bell will initially market is rated excellent in terms of reliability. The new subsidiary will also inherit AT&T's reputation for fast service and maintenance — an important marketing advantage since surveys show that service and maintenance are far and away the top considerations for business buyers.

Shakeout in the Market?

Many telecommunications industry analysts expect the confusion caused by deregulation and divestiture to trigger a shakeout among suppliers of customer-premises equipment. For vendors of PBXs, the realignment could be close at hand. There are now at least 30 makers in the market in addition to AT&T, offering more than 150 models. Newcomers include recent entrants from the data-processing field like Datapoint Corp. and start-ups backed by large corporations, such as Exxon Corp.'s Intecom and United Technologies Corp.'s Lexar. Waiting in the wings, moreover, is International Business Machines Corp., which signed an agreement on digital switches with Mitel last summer.

Industry observers, pointing to the mounting pricing pressures in the industry, maintain that the marketplace cannot and will not support the growing list of PBX manufacturers. To ensure that they are among the survivors, companies with entrenched positions to defend -- Northern Telecom, Rolm and GTE — have tried to strengthen their hold over the past year by introducing new products or enhancements to existing lines. Second-tier makers jockeying for position have adopted the same tactic. Mitel, for example, added a digital PBX to its line of analog switchboards, while American Telecom and Harris expanded their digital offerings. For its part, NEC Telephones introduced enhancements for the digital NEAX 22 series.

Where all this positioning leaves makers still scrambling for a foothold in the market is unclear. Among these makers are Oki Electronics of America, which manufactures the Discovery III line of analog PBXs as well as the Spectrum digital series, and Hitachi America, which recently started shipments of its digital entry, the Digital Communications Controller, plus such other makers as Siemens, ITT and United Technologies' Stromberg-Carlson. If, however, analysts are right that survival in the American PBX market depends largely on the ability to make continuing technological advancements, these two U.S. subsidiaries of Japanese companies and American Telecom and NEC Telephones should be among the winners.

Unlike the PBX market, the market for key telephone systems, while crowded, does not appear headed for a shakeout. What does concern some industry observers, though, is the recent flurry of feature-laden hybrid key systems and electronic key systems, targeted primarily at the low-end key system customer. Equipment like Iwatsu America's

Omega IV Super Key, the CS 150 series by Hitachi America, NEC Telephones' Electra 16/48 or the Toshiba America Strata VI, they argue, is too expensive, complex and difficult to maintain for the small key system user. Still, other industry watchers maintain that sophisticated hybrids and EKTSs are critical to the continuing ability of these four firms to capture a chunk of the replacement market for small-configuration PBXs.

For further information, contact Susan MacKnight.

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Table 1: U.S. Apparent Domestic Consumption of Telephone Terminal and Switching Equipment, 1977-81

(in thousands of dollars)

	1977	1978	1979	1980	1981
Total Shipments	$5,843,874	$6,433,018	$7,498,735	$8,479,841	$8,706,672
Total Exports	156,372	297,800	344,200	428,751	523,523
Total Imports	102,894	189,228	265,765	343,438	403,627
Trade Balance	53,478	108,572	78,435	85,313	119,896
Apparent Domestic Consumption	5,790,396	6,324,446	7,420,300	8,394,528	8,586,776
Exports as Percent of Apparent Domestic Consumption	2.7%	4.7%	4.6%	5.1%	6.1%
Imports as Percent of Apparent Domestic Consumption	1.8%	3.0%	3.6%	4.1%	4.7%
Exports to Japan as Percent of Apparent Domestic Consumption	*	0.1%	0.1%	0.1%	0.1%
Imports from Japan as Percent of Apparent Domestic Consumption	0.6%	1.2%	1.2%	1.5%	2.2%

*Less than 0.05 percent.

Source: Derived from following tables.

Table 2: U.S. Shipments of Telephone Terminal and Switching Equipment, 1977-81

(in thousands of dollars)

	1977	1978	1979	1980	1981(p)
Telephone Switching and Switchboard Equipment	$2,820,472	$3,230,521	$3,653,256	$4,254,301	$4,257,694
Private Branch Exchange Equipment	370,752	531,386	651,270	852,929	1,141,872
Common Carrier					
Manual			27,634	16,889	27,485
Electromechanical	315,798	406,658	41,457	26,788	22,246
Electronic			341,513	434,465	651,433
Private Carrier					
Manual			8,985	3,763	3,209
Electromechanical	54,954	124,728		7,913	4,893
Electronic			231,681	363,111	432,606
Central Office Switching Equipment	1,628,666	1,693,896	1,873,088	1,943,927	1,766,999
Local Switching	1,444,815	1,457,670	1,612,111	1,594,694	1,461,430
Toll Switching	183,851	236,226	260,977	349,233	305,569
Other Telephone Switching and Switchboard Equipment	821,054	1,005,239	1,128,898	1,457,445	1,348,823
Telephone Instruments	673,903	823,935	965,178	857,669	987,943
Pushbutton Type	341,295	380,963	519,410	476,300	583,206
Dial Type	151,461	152,063	159,126	135,806	105,688
Other (call directors, key sets and special purpose)	181,147	290,909	286,642	245,563	299,049
Other Telephone and Telegraph Equipment (excluding telegraph, teleprinter and carrier equipment)	2,349,499	2,378,562	2,880,301	3,367,871	3,461,035
Total Shipments	5,843,874	6,433,018	7,498,735	8,479,841	8,706,672

Source: U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports: Selected Electronic and Associated Products, Including Telephone and Telegraph Apparatus (MA-36N)

Table 3A: Total U.S. Exports of Telephone Terminal and Switching Equipment, 1977-81

(in thousands of dollars)

	1977	1978	1979	1980	1981
Telephone Switching and Switchboard Equipment and Parts	$9,187	$94,624	$117,377	$189,165	$261,254
Telephone Instruments	6,293	10,285	17,434	23,939	26,813
Other Telephonic Apparatus and Instruments and Parts	140,892	192,891	209,389	215,647	235,456
Total Exports	156,372	297,800	344,200	428,751	523,523

Table 3B: U.S. Exports of Telephone Terminal and Switching Equipment to Japan, 1977-81

(in thousands of dollars)

	1977	1978	1979	1980	1981
Telephone Switching and Switchboard Equipment and Parts	$0	$535	$364	$704	$3,054
Telephone Instruments	157	121	314	885	1,192
Other Telephonic Apparatus and Instruments and Parts	1,885	3,113	4,887	4,527	2,714
Exports to Japan	2,042	3,769	5,565	6,116	6,960

Source: U.S. Department of Commerce, U.S. Exports (FT 410)

Table 4A: Total U.S. Imports of Telephone Terminal and Switching Equipment, 1977-81

(in thousands of dollars)

	1977	1978	1979	1980	1981
Telephone Switching and Switchboard Equipment and Parts	$35,178	$77,025	$144,453	$180,171	$148,885
Telephone Instruments	8,170	37,239	34,128	51,969	127,651
Intercom Systems	5,977	7,491	5,928	6,680	7,088
Other Telephonic Apparatus and Parts	53,569	67,473	81,256	104,618	120,003
Total Imports	102,894	189,228	265,765	343,438	403,627

Table 4B: U.S. Imports of Telephone Terminal and Switching Equipment from Japan, 1977-81

(in thousands of dollars)

	1977	1978	1979	1980	1981
Telephone Switching and Switchboard Equipment and Parts	$13,998	$34,740	$47,966	$66,793	$71,764
Telephone Instruments	4,906	13,141	10,577	24,290	69,296
Intercom Systems	2,700	4,623	2,953	2,628	3,388
Other Telephonic Apparatus and Parts	15,256	24,182	24,008	28,435	46,835
Imports from Japan	36,860	76,686	85,504	122,146	191,283

Source: U.S. Department of Commerce, U.S. Imports for Consumption and General Imports (FT 246)

Table 5: Japan's Apparent Domestic Consumption of Telephone Terminal and Switching Equipment, 1977-81

(in thousands of dollars)

	1977	1978	1979	1980	1981
Total Production	$996,495	$1,475,699	$1,572,100	$1,611,498	$1,900,408
Total Exports	218,471	369,878	359,585	380,746	617,859
Total Imports	5,095	7,314	8,728	18,471	29,916
Trade Balance	213,376	362,564	350,857	362,275	587,943
Apparent Domestic Consumption	783,119	1,113,135	1,221,243	1,249,223	1,312,465
Exports as Percent of Apparent Domestic Consumption	27.9%	33.2%	29.4%	30.5%	47.1%
Imports as Percent of Apparent Domestic Consumption	0.7%	0.7%	0.7%	1.5%	2.3%
Exports to the United States as Percent of Apparent Domestic Consumption	6.1%	7.7%	7.4%	9.9%	14.8%
Imports from the United States as Percent of Apparent Domestic Consumption	0.3%	0.4%	0.5%	0.9%	1.8%

Source: Derived from following tables.

Table 6: Japan's Production of Telephone Terminal and Switching Equipment, 1977-81

(in thousands of dollars*)

	1977	1978	1979	1980	1981
Telephone Instruments	$107,590	$149,971	$173,652	$182,447	$186,202
Dial Type	57,611	66,161	72,438	66,098	65,820
Pushbutton Type	6,834	19,241	28,616	27,022	29,586
Other	43,146	64,569	72,597	89,327	90,795
Telephone Switching and Switchboard Equipment	674,642	985,896	996,573	977,957	1,109,658
Electronic Switching Equipment	219,031	388,999	497,750	547,826	687,689
Crossbar Switching Equipment	410,335	531,268	411,221	350,900	343,616
Other Switching Equipment and Attachments	45,276	65,629	87,602	79,232	78,353
Other Telephonic Equipment	214,264	339,831	401,876	451,094	604,548
Key Telephone Systems	144,605	250,204	270,690	299,938	434,497
Telephone Answering Equipment	n.a.	n.a.	27,147	31,565	43,448
Other Telephonic Attachment Equipment	11,095	17,658	18,541	23,688	30,312
Intercom Systems	29,221	40,377	43,429	55,085	52,716
Other Telephone Equipment	29,343	31,591	42,069	40,818	43,575
Total Production	996,495	1,475,699	1,572,100	1,611,498	1,900,408

*The following average annual exchange rates, which reflect the midpoint on the Tokyo spot foreign exchange market, were used to convert the yen production figures: 1977, ¥268.51; 1978, ¥210.44; 1979, ¥219.14; 1980, ¥226.74; and 1981, ¥220.54.

Source: Japan, Ministry of International Trade and Industry, Yearbook of Machinery Statistics

Table 7A: Japan's Total Exports of Telephone Terminal and Switching Equipment, 1977-81

(in thousands of dollars*)

	1977	1978	1979	1980	1981
Crossbar Telephone Exchanges	$75,656	$128,923	$75,590	$55,464	$83,309
Electronic Telephone Switchboards and Exchanges	10,911	37,520	76,767	80,280	107,944
Other Telephonic Switchboards and Exchanges	2,996	4,698	3,334	8,797	12,572
Desk and Wall Telephone Instruments	12,026	9,546	13,335	24,537	34,953
Other Telephone Instruments	14,208	40,182	46,455	49,652	65,199
Intercom Systems	15,038	15,461	14,871	19,409	22,580
Other Telephonic Apparatus	2,858	5,587	4,643	5,781	9,550
Parts	84,778	127,961	124,590	136,826	281,752
Total Exports	218,471	369,878	359,585	380,746	617,859

Table 7B: Japan's Exports of Telephone Terminal and Switching Equipment to the United States, 1977-81

(in thousands of dollars*)

	1977	1978	1979	1980	1981
Crossbar Telephone Exchanges	$7,542	$4,942	$2,183	$1,357	$505
Electronic Telephone Switchboards and Exchanges	5,054	5,618	7,943	22,206	14,517
Other Telephonic Switchboards and Exchanges	1,694	2,552	1,769	2,224	10,012
Desk and Wall Telephone Instruments	3,078	2,879	4,819	8,242	14,838
Other Telephone Instruments	5,151	17,612	24,829	32,171	42,144
Intercom Systems	1,727	2,210	2,374	2,821	4,104
Other Telephonic Apparatus	206	1,047	757	1,605	5,294
Parts	23,361	48,244	45,375	53,501	102,987
Exports to the United States	47,813	85,104	90,049	124,127	194,401

*The following average annual exchange rates, calculated by the Ministry of Finance, were used to convert the yen export figures: 1977, ¥270.42; 1978, ¥212.18; 1979, ¥217.47; 1980, ¥227.67; and 1981, ¥219.90.

Source: Japan, Ministry of Finance, Japan Exports and Imports: Commodity by Country

Table 8A: Japan's Total Imports of Telephone Terminal and Switching Equipment, 1977-81

(in thousands of dollars*)

	1977	1978	1979	1980	1981
Electronic Telephone Switchboards and Exchanges	$347	$715	$620	$2,834	$3,616
Other Telephonic Switchboards and Exchanges	349	117	39	80	208
Other Telephonic Apparatus	795	1,293	1,965	1,856	1,889
Parts	3,604	5,189	6,104	13,701	24,203
Total Imports	5,095	7,314	8,728	18,471	29,916

Table 8B: Japan's Imports of Telephone Terminal and Switching Equipment from the United States, 1977-81

(in thousands of dollars*)

	1977	1978	1979	1980	1981
Electronic Telephone Switchboards and Exchanges	$281	$650	$518	$598	$672
Other Telephonic Switchboards and Exchanges	1	25	14	1	0
Other Telephonic Apparatus	249	340	1,560	1,229	981
Parts	1,958	3,771	3,948	9,891	22,155
Imports from the United States	2,489	4,786	6,040	11,719	23,808

*The following average annual exchange rates, calculated by the Ministry of Finance, were used to convert the yen import figures: 1977, ¥270.53; 1978, ¥212.17; 1979, ¥217.46; 1980, ¥227.85, and 1981, ¥219.94.

Source: Japan, Ministry of Finance, Japan Exports and Imports: Commodity by Country